MARSHALL STAR

Marshall Space Flight Center — October 28, 1999

"We bring people to space — We bring space to people"

NASA licenses company to make quick-connect nut; fastener may have big impact in Earthly uses

by Sherrie Super

A specially designed nut — for quick and easy assembly of components in the harsh environment of space — is being licensed by NASA to a Philadelphia firm in a step that could result in saving lives on Earth.

The Marshall Center has signed a licensing agreement with M&A Screw and Machine Works of Philadelphia for the quick-connect nut.

The design permits nuts to be installed simply by pushing them onto standard bolts, then giving a quick twist. To remove, they are unscrewed like conventional nuts.

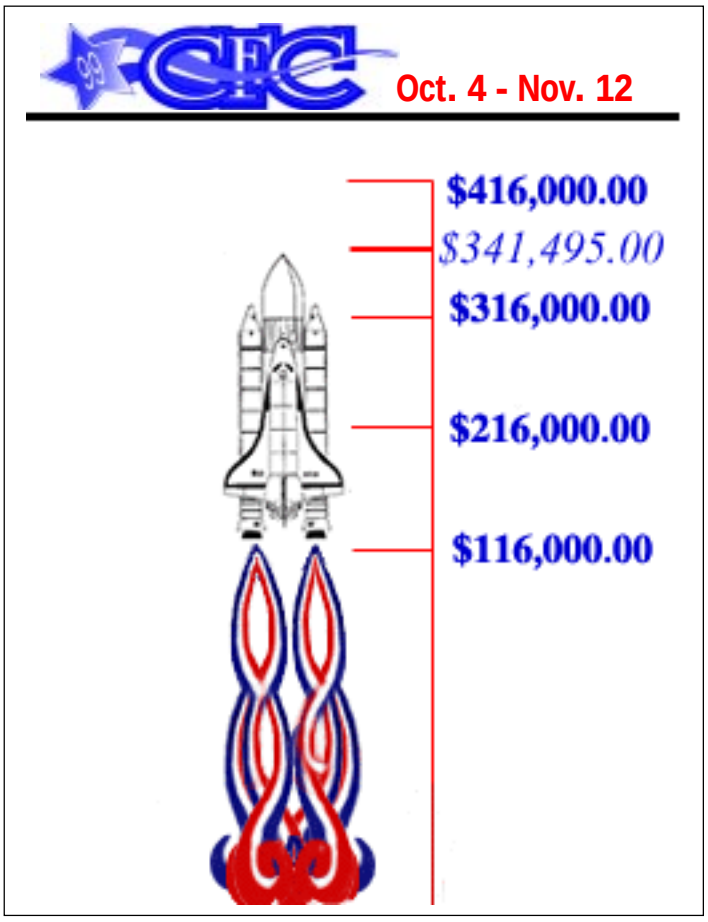
Sometimes, speed of assembly can even make the difference between life and death, according to Norman Morse, vice president of M&A.

"The mining industry is constantly erecting support barriers to shore up loose shale and rock," Morse said. "The longer it takes to erect those safety barriers, the more risk is placed on the people doing the work. This technology would help them do it much quicker."

The nut evolved from technology used in Pathfinder, a NASA project dedicated to in-space assembly

See Quick Connect on page 6

CFC contributions reach $341,495 in third week



Graphic by Sandra Lamar

by Bruce Askins

Results from the third week of the Combined Federal Campaign show a marked increase in contributions. As of Oct. 22, Marshall employees, contractors and retirees contributed more than $341,495 to this year's campaign.

Managers in many of the Center's offices are issuing challenges to employees in an attempt to boost participation. As a result, a lot of hair may fall in the Engineering Directorate and the deputy director of the Customer and Employee Relations Directorate may kiss a pig.

Challenges issued include:

• If the Engineering Directorate gets 95 percent CFC participation, Jim Kennedy, the director, will get his head "shaved bald."

• If the Structures, Mechanics and Thermal Department in the Engineering Directorate gets 95 percent CFC participation, Pete Rodriguez, an engineer in the department's Integrated and Analysis Design Office, will allow department manager Dan Dumbacher to cut his hair very short on video camera!

• If the Materials Processes and Manufacturing Department gets 85 percent CFC participation, Steve Gentz, a deputy group leader, and Wayne Gamwell, a team leader, will get the "Marine high and tight haircut." If the Department gets 90 percent CFC participation, Paul Munafo, the deputy manager, will get the "Marine high and tight haircut." If the Department gets 92 percent CFC participation, department manager Ann Whitaker will get a "pixie" haircut.

• If the Customer and Employee Relations Directorate (CaER) gets 100 percent CFC participation, Susan Cloud, the deputy director, will kiss a pig! CaER got 100 percent last year.

The writer is the CFC chairman.

"Safety — It's a Lifestyle"
— Safety slogan submitted by
Pamela Vaughn, SCSC

Mars Orbiter investigation board starts initial report

The NASA review board investigating the loss of the Mars Climate Orbiter has completed its first round of meetings, and has begun preparing a report on its initial findings.

"Mission team members from the Jet Propulsion Laboratory and Lockheed Martin have responded fully to all of our requests for information," said board chairman Art Stephenson, Marshall Center director. "We clearly will have some specific recommendations relevant to helping ensure the successful landing of the Mars Polar Lander, and we already have begun providing informal feedback to the lander team, given their tight schedule. We also have made good progress toward identifying the root causes of the orbiter mission failure."

The failure review board will brief officials at NASA Headquarters on its initial findings on Friday. The board then will deliver an initial written report to NASA by Nov. 5. A second report due by Feb. 1, 2000, will address lessons learned and recommendations to improve NASA processes to reduce the probability of similar incidents in the future.

The Mars Polar Lander is scheduled to land on layered terrain near the south pole of Mars on Dec. 3. The next thruster firing to fine-tune the spacecraft's flight path for its approach to Mars is now scheduled for Saturday.

The Mars Climate Orbiter was lost as it was entering orbit around Mars on Sept. 23. The orbiter and lander are part of a series of missions in a long-term program of Mars exploration managed by the Jet Propulsion Laboratory for NASA's Office of Space Science in Washington, D.C. The Laboratory's industrial partner is Lockheed Martin Astronautics of Denver, Colo. The Jet Propulsion Laboratory is a division of the California Institute of Technology in Pasadena, Calif.

Message from the Administrator

NASA's FY 2000 budget approved

On Oct. 20, President Clinton signed the appropriations bill that includes NASA's funding for FY 2000.

The bill is an investment toward a stronger and more vital America in the 21st century. The bill includes $13.653 billion for NASA, an additional $74.3 million over the President's request.

Three months ago, NASA's budget potentially faced more than a $1 billion reduction. With the signing of the bill, we can breathe a collective sigh of relief. It was because all of our voices were heard that the Congress responded. You, our contractors, space advocacy groups, students, teachers and citizens who cared about NASA, shared your concerns with your elected representatives. The Congress and the President recognize that the work you do will help open the space frontier, develop new technologies, strengthen our economy and enrich lives in the new century.

Dan Goldin

"I am proud to be a part of the NASA team," said NASA Administrator Dan Goldin. " As we enter the new millennium, we will continue to make the American public proud of their space program."

Civil Service Survey

Marshall's employees may give input

This fall, Marshall employees may be among the 750 NASA employees who will get a chance to tell federal managers and policymakers what they think about their work, their work environment and what kind of job their supervisors are doing.

These employees will be chosen randomly to be part of a sample of over 18,000 federal employees invited to complete the Merit Principles Survey (MPS-2000). The survey is conducted every three years by the U.S. Merit Systems Protection Board to help monitor the health of the civil service, and is the only government-wide survey that has been tracking employee perceptions about their work since the early 1980s.

The survey is completely confidential and addresses a variety of workforce issues, including quality of work, turnover, supervision, performance management, job satisfaction, fair treatment and employee selection. Survey results will be widely disseminated inside and outside government to stimulate discussions that may shape federal workforce policies and regulations.

It doesn't take long to fill out the survey and those who do so will be representing not just themselves, but the entire federal civilian workforce. Each respondent will be speaking to the government's top decision-makers on behalf of over 1.5 million federal coworkers.

Obituaries

Currie, Roy E., 73, of Huntsville, died Oct. 1. He retired from Marshall in 1981 where he worked as a supervisory electronics engineer in the Science and Engineering Directorate. He is survived by his wife, Mary R. Currie.

Sandlin, Pryer W., 71, of Hartselle, died Oct. 15. He retired from Marshall in 1986 where he worked as an aerospace engineer technician in the Structures and Propulsion Laboratory. He is survived by one son and two daughters.

In new Chandra X-ray image

Extended X-ray jet in nearby galaxy reveals energy source

The Marshall-managed Chandra X-ray Observatory has made an extraordinary image of Centaurus A, a nearby galaxy noted for its explosive activity. The image shows X-ray jets erupting from the center of the galaxy over a distance of 25,000 light years.

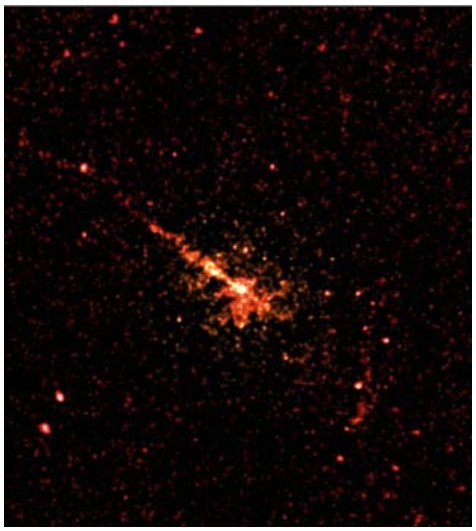
Also detected are a group of X-ray sources clustered around the nucleus, which is believed to harbor a supermassive black hole. The X-ray jets and the cluster of sources may be a byproduct of a titanic collision between galaxies several hundred million years ago.

Astronomers have accumulated evidence with optical and infrared telescopes that Centaurus A collided with a small spiral galaxy several hundred million years ago. This collision is believed to have triggered a burst of star formation and supplied gas to fuel the activity of the central black hole.

Dr. Giuseppina Fabbiano of Harvard-Smithsonian likens the newest image to "having a whole new laboratory to work in. Now we can see the main jet, the counter jet and the extension of the jets beyond the galaxy. It is gorgeous in the detail it reveals," she said.

Marshall's Dr. Allyn Tennant agreed. "It's incredible, being able to see all that structure in the jet," he said. "We have one fine X-ray telescope."

To follow Chandra's progress, visit the Chandra site at: http://chandra.nasa.gov



NASA/CXC/SAO

Centaurus A as seen by the Chandra X-ray Observatory

Marshall part of GLOBE network

by Sherry Super

Students at Morris Elementary School in Huntsville record their daily atmospheric science observations as part of a program called Global Learning and Observations to Benefit the Environment (GLOBE), a hands-on science and education program.

The Marshall Center is a partner in GLOBE, a worldwide network of students, teachers and scientists working together to learn more about our planet. Morris Elementary is one of more than 7,500 schools in 83 countries participating in the program.

In addition to Marshall Center, other GLOBE partners in Alabama include the University of Alabama in Huntsville, the Alabama State Department of Education and numerous universities and school systems across the state.

Students participating in GLOBE make environmental observations — such as their local temperature or the amount of cloud cover — and report them through the Internet. Observations made locally join observations from students throughout the world, forming global images of our planet's environment. These can be viewed at: http://globe.gsfc.nasa.gov

Nationally, GLOBE is an interagency program of NASA, the National Oceanic and Atmospheric Administration, National Science Foundation, Environmental Protection Agency, and the Departments of Education and State. It is sponsored by the executive office of the vice president.

The writer, a contractor employed by ASRI, supports the Media Relations Department.

Center Air Operations manager directing 'Little Shop of Horrors'

by Debra Valine

Larry Fine, manager of Marshall's Air Operations, is a man of many talents both on and off the job. He's putting one of those talents to use as director of Theatre Huntsville's production of "Little Shop of Horrors," which begins Friday, just in time for Halloween.

At Marshall, Fine takes care of the NASA3 Gulfstream aircraft based at Marshall, and oversees the contractor, Bionetics, that provides pilots and maintenance for the aircraft. The NASA3 seats 12-passengers and is available for use by any office on the Center as long as it's cost justified.

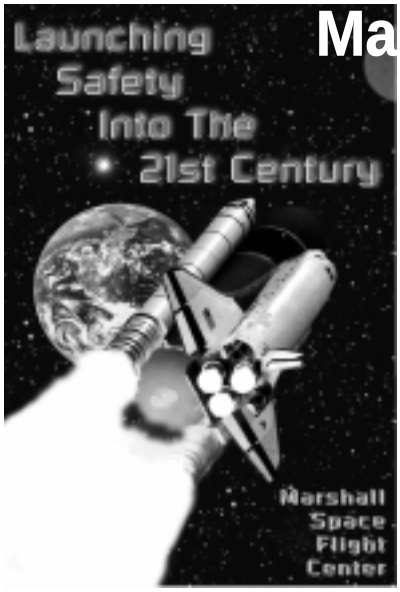
Fine is a licensed pilot who annually verifies the contract pilots are observing proper flying procedures. Every six months the pilots attend simulator training at the plane's manufacturer in Savannah, Ga.

Although he holds a master's degree in cardiovascular physiology from Michigan State University School of Medicine in East Lansing, Mich., Fine found a home in aviation at Marshall 16 years ago.

"I left the medical research field to work in aviation," said Fine, who arrived in Huntsville 17 years ago by way of Illinois, Michigan, New Jersey and Colorado. "I came to help put together Southeastern Airlines."

But after a year, the company was bought out by Atlantic Southeastern Airlines. At that time, Fine saw a job vacancy announcement for Air Operations manager at Marshall. He was offered the job based on his civilian piloting experience.

*See **Fine** on page 7*

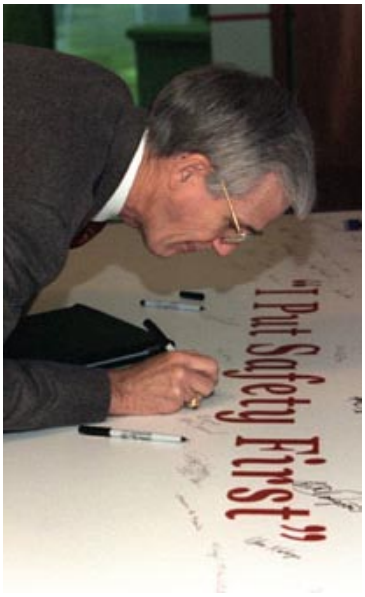


Marshall Safety Day

Safety Day stand down last week provided employees at Marshall another opportunity to focus on safety as the No. 1 priority at the Center.

Wednesday's events included programs featuring guest speakers, astronaut visits, a Safety and Health Fair, presentations of Safety Excellence Awards, lunch catered by Chick-fil-A and safety focus meetings.

NASA Administrator Dan Goldin has emphasized that employees must focus on safety first in all endeavors.



Clifton Kirby of the Structures, Mechanics and Thermal Department in the Engineering Directorate signs a banner proclaiming he "Puts Safety First."

The Occupational Safety and Health Administration's Voluntary Protection Program was unveiled at Safety Day.

Astronauts participating in Safety Day activities visited with vendors and learned about their products.

Amanda Goodson, left, director of Marshall's Safety and Mission Assurance Office, and Center Deputy Director Carolyn Griner, center, pause to talk with one of the many Safety Day vendors.

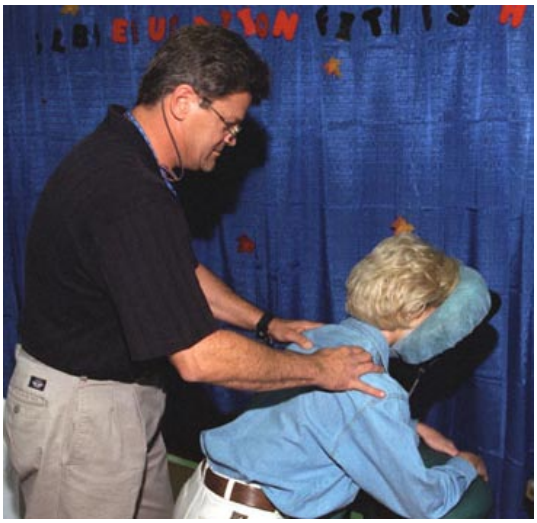
Cathy Fletcher, right, of the Space Science Department of the Science Directorate, talks with a vendor about her products.

Safety Day

Continued from page 4

Alease Sims, left, a contractor with Ai Signal Research Inc., talks with astronauts at the picnic lunch.

Chick-fil-A catered lunch for Safety Day attendees.



Bill Carter, left, a neuromuscular and massage therapist with the NASA Exchange, demonstrates how a massage can help reduce stress.

Marshall Center's safety goal:
Be No. 1 in safety within NASA!

Safety Excellence Awards

MANAGER AWARD:
Dave Bates, Office of the Chief Financial Officer (not present)
James Ellis, Safety and Mission Assurance Office

INDIVIDUAL AWARDS:
Portia B. Dischinger, Information Services Department, Center Operations Directorate
James R. Stephens, Structures, Mechanics and Thermal Department, Engineering Directorate
Thomas S. Reed, Safety and Mission Assurance Office (not present)
Rodney N. Phillips, Structures, Mechanics and Thermal Department, Engineering Directorate
Pravin K. Aggarwal, Structures, Mechanics and Thermal Department, Engineering Directorate
Patrick D. McManus, Avionics Department, Engineering Directorate
M. F. Dodd, Hernandez Engineering Inc.
Karen K. Long, Hernandez Engineering Inc.
Susan H. Spencer, Advanced Concepts Department, Space Transportation Directorate
Chris Popp, Vehicles and Systems Development Department, Space Transportation Directorate (not present)
Joan Trolinger, Subsystem and Component Development Department, Space Transportation Directorate
Charles Winkler, Information Services Department, Center Operations Directorate
John Salisbury, Scientific and Commercial Systems Corp./Cortez III

TEAM AWARDS

CHANDRA X-RAY TEAM:
Jerry B. Graham, Chandra Chief Engineers Office
Steve Terry, Chandra Chief Engineers Office
Anthony R. Lavoie, Chandra Chief Engineers Office
Gale L. Grove, TRW Inc. (not present)
Jerry L. Jennings, TRW Inc. (not present)
Jeffrey J. Shirer, TRW Inc. (not present)
Dan Shropshire, TRW Inc. (not present)
Maricruz T. Yerkes, TRW Inc. (not present)
Marilyn Newhouse, Computer Sciences Corp. (not present)
Tom Hushka, Hernandez Engineering Inc. (not present)
Jim Flickinger, Madison Research Corp.

SHUTTLE SPIRIT TEAM:
Dennis Moore, Space Shuttle Projects Office
Carol Bryant, Space Shuttle Projects Office (not present)
Len Worlund, Space Shuttle Projects Office
Roy Runkle, Space Shuttle Projects Office (not present)
Sandra Norris, Space Shuttle Projects Office (not present)

SCIENTIFIC AND COMMERCIAL SYSTEMS CORP. TEAM:
Rich Mayhew
Wade Martin

Photos by Marshall's Imaging Services

Countdown to Y2K
64 Days Left

Keep at least half a tank of gas in your car.

Courtesy of Information Services Department

Mars injector tests

A series of 40 hot-fire tests recently were conducted at Marshall on four injector configurations at various mixture ratios. The tests involved liquid methane and liquid oxygen as the main propellants. The injectors are for potential future Mars ascent engines.

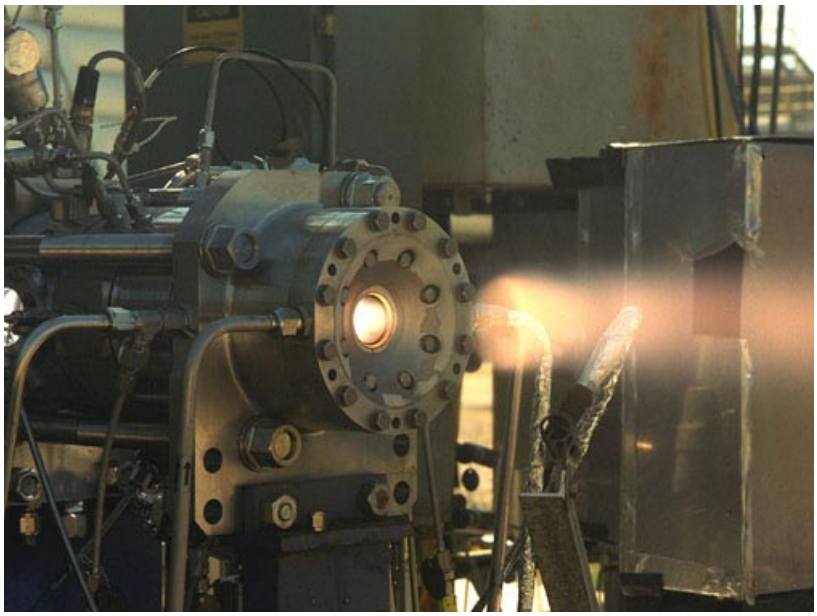


Photo by Dennis Olive, NASA/Marshall Space Flight Center

Quick Connect

Continued from page 1

techniques. Its licensing to M&A is an example of how NASA brings its technology into the private sector, according to Sammy Nabors of Marshall's Technology Transfer Department.

Technology transfer is the process of developing, transferring and commercializing space program technology for the benefit of American people, American businesses, universities and government agencies. Improving America's standard of living and keeping the nation competitive in the global economy are the bottom-line results.

NASA photo by Doug Stoffer

The quick-connect nut, developed at Marshall, can be installed simply by pushing it onto a standard bolt, then tightening with a couple of quick twists.

"We offered this fastener for licensing to help improve assembly processes on Earth," Nabors said. "In situations where seconds count, having to make 10 or 20 turns on a nut before it starts to tighten wastes time — usually meaning money, too."

Bruce Weddendorf, the engineer who invented the fastener in a Marshall Center laboratory, sees possibilities for using quick-connect technology undersea. "This could be used for assembling oil drilling platforms," he said. "Space and undersea have a lot of common problems. Time is really critical, because both environments are dangerous, and it's very expensive to keep someone in either one."

Other potential applications include assembly of underwater salvage equipment, fire-fighting equipment, scaffolding, assembly-line machinery, industrial cranes and even to change lug nuts on race cars.

"The guys on the pit crews are already really fast, but this would help greatly in that world of competition where time is so critical," Weddendorf said.

Due to their specialized nature, quick-connect nuts are not something consumers can buy at their local hardware store. "These are not the small, inexpensive nuts you would find in a jar in your workshop," Morse said.

Quick-connect nuts typically are more than three times the size of common nuts and custom-made to each specific application. Their cost can range from $35 to more than $200 each, depending on size, material specifications and quantity needed.

But, quick-connect nuts fill a critical need when time and safety are more important than cost, Morse said.

M&A, specializing in standard fasteners, manufactures quick-connect nuts by custom order in Philadelphia.

Through licensing, U.S. patents owned by NASA are made available to industry in return for royalties paid to the inventors and their NASA Center. Technologies developed for the space program have enabled American industry to introduce more than 1,200 new or improved products for sale at home and abroad, including cordless tools, motion simulators and smoke detectors.

The writer, a contractor employed by ASRI, supports the Media Relations Department.

Upcoming Events

Open House — The Structures, Mechanics and Thermal Department will host an open house from noon-3 p.m. Nov. 3, in Bldgs. 4610 and 4619. We encourage everyone to tour the buildings and enjoy our displays, activities and refreshments.

New Substore hours — Beginning Nov. 1, operating hours for the Substore in Bldg. 4471 will be changed to 8 a.m.-3 p.m. During non-operating hours, requests for emergency issues should be directed to Robbie Saint at 544-9618 or 651-5009.

Program and Project Management Forum — All Marshall team members are encouraged to attend a Program and Project Management Forum from 9-11 a.m. Friday in Morris Auditorium. A discussion on the Broad Area Review (BAR) report will provide insight into process changes in the launch vehicle industry that precipitated recent hardware losses. These findings are applicable to all of Marshall's aerospace projects, as well as the launch vehicle industry.

Candidates nominated for NASA Exchange election

Two candidates have been nominated through petition by Center employees for an elected position on the Marshall's NASA Exchange Council.

The candidates are Larry Gagliano of the Technology Transfer Department and Steven R. Noneman of the Flight Projects Directorate.

Election ballots on Marshall NASA Exchange letterhead have been mailed to employees. The deadline for ballots to be returned to the Exchange is Nov. 15.

Ballots also are available in the Exchange all-purpose room, Bldg. 4752, in the event they are not received in the normal mail distribution.

Larry Gagliano

Steven Noneman

Fine

Continued from page 3

"Once I got here, I found Marshall to be a great place to work," said Fine, also Marshall's aviation safety officer. "The cutting-edge aeronautical research done at NASA has kept me here." It's the opportunities to do other things that keep his job interesting, he said. "I dove in the Neutral Buoyancy tank when it was open, have served as Marshall's picnic chairman, narrated a retirement dinner and provided voiceover for videos."

In his off time, Fine has three hobbies: He announces the University of Alabama in Huntsville Chargers hockey games fall and winter weekends; in the spring and summer he coaches the Huntsville Sharks, an 18-and-under girls' fast-pitch softball team; and in his spare time, he acts in and directs community theater. He's been active in theater for almost 40 years.

His current theatrical project is directing "Little Shop of Horrors" at the Von Braun Center Playhouse. The musical comedy features 13 local cast members and 45 behind-the-scenes people. The play will be presented Friday-Oct. 31 and Nov. 3-6. For ticket information, call Theatre Huntsville at 852-8730.

Fine started his stage career in second grade. "The teacher asked if anyone would volunteer to be master of ceremonies for a Christmas program. I was the only one dumb enough to put my hand up. That is how I got my start. I have done high school, college and community theater."

For the last eight years, Fine has worked on the Grissom High School spring musical, designing sets and teaching students theater craft. For the first time, one of Fine's children, Lindsay, a Grissom freshman, will be in the Grissom production next spring.

Fine and wife Louise, an art teacher at Weatherly and Chapman elementary schools in Huntsville, have another daughters, Lauren, who is studying rehabilitative therapy at Mississippi State University and is a women's fast-pitch softball team hopeful.

The writer, a contractor employed by ASRI, is the Marshall Star editor.

Courtesy photo

Larry Fine, Marshall's Air Operations manager, left, works with cast members for the upcoming production of "Little Shop of Horrors" at the Von Braun Center Playhouse.

Employee Ads

Miscellaneous

★ Raker stainless steel propeller for OMC, 14-1/2x24, $200. 882-2773
★ Sears Lifestyler treadmill, $250; camel back queen-size sleeper sofa, mauve, $175. 586-2852
★ Office desk, $75; Sony TV, 27" console, $375; lawnmower, $45. 859-9575 after 5 p.m.
★ TV stand, holds up to 40" TV, black, glass doors, storage, new in box, $25. 883-9278
★ Brambach upright piano and bench, recently tuned, $700. 971-9710
★ Truck bedliner, 97-00 Ford F150 shortbed, factory new, $100. 534-7791
★ Emerson TV, 4714, VHF-UHF signal-amplifying antenna. 722-9483
★ 1996 Lowe 20' pontoon boat, 50hp Evinrude, fishing package, low hours. 882-3045 after 6 p.m.
★ Fiberglass camper shell for Ford 150, SWB, $300; Husky tool box for compact pickup, $100. 858-2291
★ Walnuts, $2 per 5-gallon bucket. 880-2290
★ Iomega 250 MB internal zip-drive w/Iomega Ware and Zip Tools software, $145. 837-3746
★ Cartridge for inkjet printers, HP51629A, large, black, unopened, $30; one partially used cartridge, $15. 772-0558
★ Four original rims from 1980 Trans AM, includes center hubs and lug nuts, $300. 859-5624
★ Oak and hickory firewood, cut to any length, will deliver. 931-433-6642
★ Four tickets to Alabama/Louisiana State game, 11/6 and Alabama/Mississippi St. game, 11/13, best offers. 536-5132
★ Vent free (LP) gas fireplace insert w/blower, brass trim; couch w/2 lamps. 837-7999
★ Antique upright converted player piano, $250. 880-8427
★ 1996 RAM truck 1500-3500 service manual, $30. 883-5955

Vehicles

★ 1984 Ford Ranger, 103K miles, $1,500 obo. 883-7987 after 5:30 p.m.
★ 1978 Ford Econoline E-100 conversion van, AT, a/c, new brakes, engine has cracked piston ring, $700 obo. 882-3902
★ 1977 Porsche 924, silver w/black interior, 4-speed, sunroof, 138K miles, $2,200 obo. 828-6213
★ 1985 Toyota SR5 truck, X-tra cab, 115K miles, 22R engine, 5-speed, hitch, bedliner, $2,950 firm. 753-2278
★ 1992 Nissan 240SX hatchback, 63K miles, red, 5-speed, loaded, keyless entry w/security system, $8,900. 883-6416
★ 1996 Volvo 850 turbo sedan, loaded, leather, maintenance records, 95K miles, $18,500 obo. 931-759-5248
★ 1994 Ranger XLT extended cab, white/red, auto, 3.0L, air, AM/FM cassette, 38K miles, Brahma Cap, $9,000. 881-0551 or http://fly.highway.net/~hoffmrj/
★ 1992 Mercury Sable, all power, runs well, $4,400 obo. 852-3314
★ 1989 Olds Cutlass Ciera, 2.8L, V6, all-power, tilt, cruise, alloy wheels, 130K miles, $2,000. 722-0076
★ 1997 Jeep Wrangler, red w/black soft top, 6-cylinder, 5-speed, 4.0L, a/c, 72K miles, aluminum wheels, must sell. 544-1245/355-1353

Free

★ 6-week old kittens, desire to live indoors, 1 female, 2 males. 796-0525 after 5 p.m.

Wanted

★ Tickets for Alabama/Auburn football game on 11/20. 772-1969 after 6 p.m.
★ Mature caregiver for two boys (10 & 5), Mon.-Fri., 2:30-5:30 p.m., Hampton Cove, must have transportation/references. 533-5942

Found

★ Reading glasses at Chick-fil-a outing 10/10/99 in men's room, Picnic Area, contact Carl Lovett, east test stand area.
★ Sunglasses and case at D-13 Gate. 544-4541 to identify
★ Sterling silver ring, Bldg. 4200. 544-4541 to identify
★ Sunglasses, parking lot, Bldg. 4200. 544-4541 to identify
★ Thermos, Bldg. 4200. 544-4541 to identify
★ Mickey Mouse watch, parking lot, Bldg. 4200. 544-4541 to identify
★ Electronic memo pad, parking lot Bldg. 4663. 544-4541 to identify
★ Three keys (one Toyota key), Bldg. 4723. 544-4541 to identify
★ Bracelet, found during Center Operations All Hands Mtg. at Sci-Quest, Calhoun Community College. 544-4541 to identify
★ Copper bracelet, visitor parking lot, Bldg. 4200. 544-4541 to identify
★ Ledger book, lobby area outside G-13, Bldg. 4200. 544-4541 to identify

Center Announcements

☛ ***Photo Lab Retirees Meet* —** Photo Lab retirees will meet at 9:30 a.m. Nov. 2 at Shoney's at University Drive and Memorial Parkway. For more information, call Charles Allen at 852-0917.

☛ ***MOO Meets* —** The Management Operations Office (MOO) retirees, will meet for breakfast/lunch at 10 a.m. on Thursday at the Cracker Barrel in Madison. Present and former MOO employees are welcome. For more information, call 539-0042.

☛ ***Redstone Toastmasters* —** Do you want to improve your speech? Visit and join Redstone Toastmasters, which meets weekly at 6 p.m. on Tuesday at Piccadilly Cafeteria in Madison Square Mall. For more information, call Joe Jones at 461-0476.

☛ ***Lunar Nooners Toastmasters* —** The NASA Lunar Nooners Toastmasters Club meets Tuesday at 11:30 a.m. in Bldg. 4610 cafeteria conference room. All Marshall employees, contractors and friends are invited to attend. For more information, call Lee Johns at 544-5142.

Job Opportunities

CPP 00-4-JP, AST, Liquid Propulsion Systems, GS-861-14, Space Shuttle Projects Office, Shuttle Integration Office. Closes Oct. 28.

CPP 00-5-RE, AST, Propulsion Flow Dynamics, GS-861-14, Space Transportation Directorate, Subsystem & Component Development Department, Functional Design Group. Closes Oct. 29.

CPP 00-2-RE, AST, Propulsion Flow Dynamics, GS-861-14, Space Transportation Directorate, Vehicle & Systems Development Department, Systems Analysis Group. Closes Nov. 5.

CPP 00-6-CP, Supervisory Operating Accountant, GS-510-15, Office of Chief Financial Officer, NASA Payroll & Center Personal Services Office. Closes Nov. 1.

CPP 99-7-CP, Equipment Specialist (Precision Instruments), GS-1670-13, Science Directorate, Space Optics Manufacturing Technology Center, Optical Design, Analysis & Fabrication Group. Closes Nov. 5.

CPP 00-3-CV, AST, Mission Support Requirements and Development, GS-801-14, Flight Projects Directorate, Payload Operations and Integration Department, Operations Training Group. Closes Nov. 8.

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